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EXAMINER	
WERNER, DAVID N	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/790,138	SONG ET AL.	
	Examiner	Art Unit	
	David N. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 16-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 16-21* is/are rejected.

7)☒ Claim(s) *17-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office action for US Patent Application 10/790,138 is responsive to communications filed 16 September 2008, in reply to the Non-Final Rejection of 16 June 2008. Currently, claims 1-13 and 16-21 are pending. Of those, claims 17-21 are new. Claims 14 and 15 are canceled.

2. In the previous Office action, claim 13 was rejected under 35 U.S.C. 101 as non-statutory. Claim 11 was rejected under 35 U.S.C. 103(a) as obvious over US 5,539,466 A (Igarashi et al.). Claims 1-3, 6-8, and 12-16 were rejected under 35 U.S.C. 103(a) as obvious over Igarashi et al. in view of US 5,731,850 A (Maturi et al.), US 5,168,356 A (Acampora et al.), and US 5,185,819 A (Ng et al.). Claims 4, 5, 9, and 10 were rejected under 35 U.S.C. 103(a) as obvious over Igarashi et al., Maturi et al., Acampora et al., Ng et al., and in view of US 5,878,166 A (Legall).

Response to Amendment

3. The amendment to the specification is insufficient to correct the deficiency of claim 13 under 35 U.S.C. 101. The specification describes a computer readable recording medium as "including but not limited to storage media such as" magnetic and optical storage media. The phrases "but not limited to", "such as", and "etc." are not considered limiting, and so the amended paragraph may be considered to include the non-statutory "network" as in the original disclosure. It is suggested that paragraph 59 be amended to read:

The present invention may be embodied as computer readable codes on a computer readable recording medium, including magnetic storage media (ROMs, RAMs, floppy disks, magnetic tapes), and optically readable media (CD-ROMs, DVDs).

Response to Arguments

4. Applicant's arguments filed with regard to the rejection of claim 11 have been fully considered but they are not persuasive. The amendment has placed the limitations previously found in claims 14 and 15, now cancelled, in independent claim 11. In the previous Office action, US Patent 5,539,466 A (Igarashi et al.) was cited as the sole reference for claim 11, but secondary references US 5,168,356 A (Acampora et al.) and US Patent 5,185,819 A (Ng et al.) were relied on as disclosing the limitations of claims 14 and 15. Applicant is reminded that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

5. Applicant's arguments filed with regard to the rejection of claim 1 have been fully considered but they are not persuasive. Applicant states that since a motion vector (MV) is not a sum of absolute differences (SAD), determining a motion compensation mode "corresponding to the minimum value" of an SAD, as claimed, is not the same as determining a motion compensation mode based on the motion vector, as in Acampora et al. However, in Acampora et al., the motion vector that determines the motion compensation mode is the one that is produced from a minimum distortion (column 7:

line 42–column 8: line 3). Since the SAD is a known, if not expected, means of determining distortion, as shown by the Igarashi reference and Maturi reference, by choosing the motion vector of Acampora et al. with a lowest distortion, as measured by the SAD, the least SAD itself is also necessarily chosen. A prior art device anticipates a claimed process if the device carries out the process during normal operation. MPEP 2112.02.

Claim Objections

6. Claim 17 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 17 states that steps (c) and (d) of claim 1 are performed without performing an interpolative motion compensation to produce interpolative SADs. However, parent claim 1, as amended, already does not use the interpolative SADs in steps (c) and (d).

7. Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 18 states that selecting an MC mode in parent claim 6 is performed without performing an interpolative motion compensation to produce interpolative SADs. However, parent claim 6, as amended, already does not use the interpolative SADs in selecting the MC mode.

8. Claim 19 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 19 states that selecting an MC mode in parent claim 11 is performed without performing an interpolative motion compensation to produce interpolative SADs. However, parent claim 11, as amended, already does not use the interpolative SADs in selecting the MC mode.

9. Claim 20 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 20 states that selecting an MC mode in parent claim 12 is performed without performing an interpolative motion compensation to produce interpolative SADs. However, parent claim 12, as amended, already does not use the interpolative SADs in selecting the MC mode.

10. Claim 21 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 21 states that steps (c) and (d) of claim 13 are performed without performing an interpolative motion

compensation to produce interpolative SADs. However, parent claim 13, as amended, already does not use the interpolative SADs in steps (c) and (d).

Claim Rejections - 35 USC § 101

11. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

12. Claims 1-5, 13, and 16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Regarding claims 1-5 and 16, Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claims recite a series of steps or acts to be performed, the claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. In the present invention, it is nowhere stated in the claims what apparatus performs the claimed method steps.

Claim 13 is drawn to "a computer readable recording medium having recorded thereon" functional descriptive material. The amended specification, at paragraph 59, defines the claimed computer readable recording medium as encompassing statutory

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 US 780, 787-88 (1876).
[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

material such as "magnetic storage media". However, the phrasing of the definition of the recording medium using the terms "not limited to", "such as", and "etc." indicates that the definition encompasses both the statutory media as explicitly described, and non-statutory signal media as originally presented.

A signal embodying functional descriptive material is neither a process nor a product (i.e., a tangible "thing") and therefore does not fall within one of the statutory classes of §101. Rather, a "signal" is a form of energy, in the absence of any physical structure or tangible material. *In re Nuijten*, 84 USPQ2d 1495 (Fed. Cir. 2007). Because the full scope of the claim as properly read in light of the disclosure encompasses non-statutory subject matter, the claim as a whole is non-statutory.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 1-3, 6-8, 11-13, and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5,539,466 A (Igarashi et al.) in view of US Patent 5,731,850 A (Maturi et al.), US Patent 5,168,356 A (Acampora et al.), and US Patent 5,185,819 A (Ng et al.).

Igarashi et al. teaches a coder for interlaced pictures. In one embodiment of Igarashi et al., as shown in figure 1, macroblock data is sent to a frame motion detector

22 and a field motion detector 21 (column 12: lines 40-42). Frame motion detector 22 detects motion vectors between the current frame and surrounding frames, and SAD values between the current frame and surrounding frames, and outputs motion vector FMMV and frame sum of absolute differences FMAD (column 12: lines 50-54). In case of a B picture, the frame motion vector is chosen from the one of forward motion vector FMVB, backward motion vector BMVB, and a bidirectional motion vector which is the average of FMVB and BMVB, which produces the least predictive error (column 19: lines 1-14). Field motion detector 21, similarly, detects motion vectors between the current fields, and outputs field motion vector FDMV and associated field sum of absolute differences FDAD (column 12: lines 44-49). Note that a SAD value is determined for each motion vector. In case of a B frame, the field motion vector is chosen from the one of forward FMVoBo between the previous odd field and current odd field, forward FMVeBo between the previous even field and the current odd field, forward FMVoBe between the previous odd field and the current even field, forward FMVeBe between the previous even field and the current even field, backward BMVoBo between the next odd field and the current odd field, backward BMVeBo between the next even field and the current odd field, BMVoBe between the next odd field and the current even field, and BMVeBe between the next field and the current even field, which produces the least predictive error (column 19: lines 15–40). For a current odd or even field, the appropriate four of these eight field motion vectors are chosen. Next, the frame and field MV and SAD values are transmitted to a prediction mode judgment circuit 23 (column 12: lines 58-60), which determines if motion prediction will be carried

out in a field mode or frame mode by comparing the frame SADs to the field SADs. If the difference FMAD-FDAD is greater than a threshold T1, then a field mode is chosen, but if the difference FMAD-FDAD is smaller than T1, a frame mode is chosen (column 13: lines 6-21). If threshold T1 is set to 0, then the determination of field mode or frame mode is directly measured from the minimum of field or frame SADs, since the inequality FMAD-FDAD > 0 implies FMAD > FDAD, and FMAD-FDAD < 0 implies FMAD < FDAD.

Regarding claim 1, prediction mode judgment circuit 23 receives the claimed forward frame SAD, the backward frame SAD, a forward top field SAD, a forward bottom field SAD, a backward top field SAD, and a bottom backward field SAD, in step (a). The comparison of the various SADs and threshold T1 to determine motion compensation mode is steps (b) and (c).

The present invention differs from Igarashi et al. in that first, in the present invention, an interpolative field or frame mode is determined if none of the SADs are smaller than a threshold, whereas Igarashi et al does not describe this scenario, and second, the present invention uses a sum of a forward top field SAD and bottom field SAD, and a sum of a backward top field SAD and a backward bottom field SAD, as potential SADs used to determine motion compensation mode, rather than the individual field SADs and the average forward and backward frame SADs as in Igarashi et al.

Maturi et al. teaches a motion estimation system for an MPEG encoder. Regarding claim 1, in Maturi et al., in an "entire macroblock" coding mode, "Motion Estimator 56 independently cumulates the SAD for the odd-odd field and the SAD for

the even-even field and merely adds these two SADs together" (column 12: lines 4–10), and also cumulates the SADs for the odd-even field and even-odd field (column 12: lines 11–19). The one of these two cumulative modes (odd-odd and even-even; or odd-even and even-odd) that produces the minimum SAD is selected as the "entire macroblock" coding mode (column 12: lines 28–33). As shown in the table in column 12, this calculation is performed in both the forward and backward directions in a B frame. Then, the minimum of these two cumulative motion compensation modes, including an odd field SAD and an even field SAD, in both the forward and backward directions, are the "sum of a forward top field SAD and a forward bottom field SAD" and the "sum of a backward top field SAD and a backward bottom field SAD" in step (a) of the present invention.

Igarashi et al. discloses steps (a), (b), and (c) of the present invention except for the inclusion of the sums of top and bottom field SADs rather than individual field SADs and the interpolated frame SAD. Maturi et al. teaches that it was known to determine a motion compensation mode from a minimum SAD, including a sum of an odd field SAD and even field SAD in both the forward and backward directions. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the summed odd and even field SADs of Maturi et al. for the individual field SADs and interpolative frame SAD of Igarashi et al. to yield the predictable result of different options for determining a motion compensation mode without calculating additional motion vectors (Maturi et al: column 12: line 10) since it has been held that performing a simple substitution of one known element for another to

obtain predictable results involves only routine skill in the art. *In re Fout*, 675 F.2d 297, 301 213 USPQ 532, 536 (CCPA 1982); *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988); *Ruiz v. AB Chance Co.*, 357 F.3d 1270, 69 USPQ2d 1686 (Fed. Cir. 2004); *Ex parte Smith*, 83 USPQ2d 1509 (BPAI 2007).

Maturi et al. does not resolve the deficiency of only selecting a motion compensation mode if a minimum SAD value is below a threshold, and encoding in an interpolative field or frame mode if the minimum SAD value is above a threshold.

Acampora et al. teaches a video encoder. This encoder includes element 104 which calculates a forward frame motion vector (column 7: lines 44-52), element 105 which calculates a backward frame motion vector (column 7: lines 53–56), and analyzer 106, which compares the distortion produced from the forward and backward motion vectors to a threshold (column 7: lines 57–58). Although Acampora et al. does not explicitly teach using SAD as the distortion measure, the SADs, produced by Igarashi et al., with forward and backward frame motion vectors, were known in the art as common distortion measurements. If both the forward and backward frame distortions are larger than a threshold, a weighted interpolated frame according to the ratio of distortions is generated (column 7: lines 57–66). If the distortion signals are below the threshold, the motion vector that produces the smaller distortion is selected (column 7: line 67–column 7: line 3).

Ng et al. discloses a field mode version of the forward and backward motion vector generators and analyzer of Acampora et al. (column 7: lines 1-28).

Igarashi et al., combined with Maturi et al., discloses the claimed invention except for producing an interpolated frame or field if the motion vectors are above a threshold. Acampora et al. and Ng et al. teach that it was known to produce an interpolated data block if forward and backward motion vectors are above a threshold. Therefore, it would have been obvious to one having ordinary skill in the art to add the motion vector analyzers of Acampora et al. and Ng. et al. to the video coder of Igarashi et al., since Acampora et al. states in column 7: lines 57-67 that such a modification would produce a less distorted inter picture than from motion vectors alone if the motion vectors are unreliable.

Regarding claims 2 and 3, in Igarashi et al., the frame motion vector mode that produces a minimum predictive error is selected as the frame motion vector (column 19: lines 8-10), the field motion vector mode that produces a minimum predictive error is selected as the field motion vector (column 20: lines 8-11) and the decision to chose the field mode or frame mode may be determined by which of the two produces a smaller sum of absolute differences (column 13: lines 6-21). In addition, in Maturi et al., the "entire macroblock" mode derived from the sum of an even field SAD and an odd field SAD is the one that produces a minimum SAD (column 12: lines 30-33), and in Acampora et al. and Ng et al., the motion vector that produces the minimum distortion signal is chosen as the motion vector if the distortion signals are below a threshold (column 8: lines 1-3).

Regarding claim independent claim 6, prediction mode judgment circuit 23 in Igarashi et al., as modified by Maturi et al., is the claimed "SAD receiving unit",

"minimum value judgment unit", and "first selection unit". Analyzer 106 of Acampora et al. is the claimed "second selection unit".

Regarding claims 7 and 8, in Igarashi et al., the frame motion vector mode that produces a minimum predictive error is selected as the frame motion vector (column 19: lines 8-10), the field motion vector mode that produces a minimum predictive error is selected as the field motion vector (column 20: lines 8-11) and the decision to chose the field mode or frame mode may be determined by which of the two produces a smaller sum of absolute differences (column 13: lines 6-21). In addition, in Maturi et al., the "entire macroblock" mode derived from the sum of an even field SAD and an odd field SAD is the one that produces a minimum SAD (column 12: lines 30-33), and in Acampora et al. and Ng et al., the motion vector that produces the minimum distortion signal is chosen as the motion vector if the distortion signals are below a threshold (column 8: lines 1-3).

Regarding claim 11, field motion detector 21 and frame motion detector 22 of Igarashi et al. are the claimed forward SAD calculation unit and backward SAD calculation unit. Prediction mode judgment circuit 23 of Igarashi et al., as modified by Maturi et al., is the claimed motion compensation mode determination unit.

Regarding claim 12, field motion detector 21 and frame motion detector 22 of Igarashi et al. are the claimed forward SAD calculation unit and backward SAD calculation unit. Prediction mode judgment circuit 23 of Igarashi et al. is the claimed SAD receiving unit, the minimum value judgment unit, and the first selection unit. Analyzer 106 of Acampora et al. is the claimed "second selection unit".

Regarding claim 13, Ng et al. operates on a modified MPEG-1 encoder, which was known in the art to be implemented "for use with personal computer and workstation displays" (column 1: lines 20-21).

Regarding claims 16-21, in the substitution combination of Igarashi et al. and Maturi et al. in claim 1, the initial interpolative MC is not performed.

15. Claims 4, 5, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Igarashi et al., Maturi et al., Acampora et al., and Ng et al. as applied to claims 1 and 6 above, and further in view of US Patent 5,878,166 A (Legall). Claims 4, 5, 9, and 10 are directed to selecting an interpolated field mode or interpolated frame mode based on SAD statistics. Acampora et al. teaches only interpolated frame motion compensation, and Ng et al. teaches only interpolated field motion compensation.

Legall teaches a video encoding method. Regarding claims 4, 5, 9, and 10, in Legall, a choice is made for each frame whether to encode the frame in a frame mode or in a field mode (column 3: lines 24-29). In addition, in a frame mode, individual macroblocks may be encoded in a field mode or a frame mode (column 10: line 63–column 11: line 14). This decision is made by comparing a "frame activity" measure, which is the sum of absolute differences for every pixel in a block, and the sum of the two "field activity" measures (column 8: lines 41-54). If the frame activity is less than the field activity, a macroblock is encoded with frame encoding, but otherwise a macroblock is encoded with field encoding (column 11: lines 7-14). This corresponds with the claimed comparison of the sum of forward frame SAD and backward frame

SAD and the sum of forward and backward field and frame SADs in claims 4 and 9 and the "combination of SADs" in claims 5 and 10.

Igarashi et al., Maturi et al., Acampora et al., and Ng et al., when combined, disclose the claimed invention except for determining whether to encode a block in a field mode or frame mode based on total SAD values of the field mode and frame mode. Legall teaches that it was known to make a field mode/frame mode determination for a macroblock based on comparing total SAD values of a frame and the sum of the SAD values of two fields. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to choose between frame mode and field mode based on total SAD activity, as taught by Legall, since Legall states in column 3: lines 24-54 that such a modification would enable an encoder to adapt to an optimized encoding mode with a more stable bit rate depending on the amount of movement in a video.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Friday from 10:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. N. W./
Examiner, Art Unit 2621

/Mehrdad Dastouri/
Supervisory Patent Examiner, Art Unit 2621